

1-1-1986

Feasibility study for a photographic mural

Joanne Barber

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FEASIBILITY STUDY FOR A PHOTOGRAPHIC MURAL

by

Joanne Barber

Submitted in Partial Fulfillment of the
Requirements for the Degree
MASTER OF FINE ARTS

MFA PHOTOGRAPHY PROGRAM
SCHOOL OF PHOTOGRAPHIC ARTS AND SCIENCES
ROCHESTER INSTITUTE OF TECHNOLOGY
ROCHESTER, NEW YORK

27 March 1986

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P E R M I S S I O N S T A T E M E N T

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27 March 1986

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P U R P O S E

My purpose in this thesis was to produce a scale model of a mural comprised of overlapping planes of photographs of flowers. It was intended and designed for a large lobby in an institutional facility such as an office building, school or hospital.

In making the model, I attempted to solve the problems of photography, enlargement, mounting and installation that would make the mural feasible to produce in full-scale.

I N T R O D U C T I O N

I have always liked three-dimensional concepts and spatial relationships. This interest drew me to satisfying hours of sculpture, a love of geometry, an interest in architecture, and years of dancing. I also notice that most of the "art" I collect is three-dimensional.

The preference for murals is probably drawn from a subjective exposure to them for as long as I can remember. My father drew murals on the kitchen wall, all around the basement; and later in public spaces such as that used by the boy scouts, the historical society, and the Boys' Club of Chicago. After I had children, he filled an entire wall in their bedroom with a mural of story-book characters.

As far as flowers go, I like everything about them: color, shape, texture, pattern, fragrance and ambiance. There aren't many things you can say that about. My paternal grandparents were commercial flower growers and my grandmother started the first garden flower club in her state. My parents produced gardens that won prizes, and my father's set of fifty-two water color paintings of orchids were displayed in the center court of the Field Museum of Chicago along with the live plants because of their beauty and botanical accuracy. The last painting my mother made was of delphinium she could see through her bedroom window where she spent the last years of her life. It was she who made flowers a part of my life by starting me on a collection of wild flowers when I was five. Even now on vacations I still press flowers between the pages of whatever book I am reading.













What made the elements come together without any conscious realization was a proposal I was involved in submitted under contract to Kodak for a public space in Puerto Rico. Measuring 140', it would have been the longest photographic mural in the world.

Kodak eventually accepted a non-photographic solution and the proposal lay dormant for six years. About that time I was looking for a thesis project, noticed the Kodak model, and remembered how disappointed I was that it was never executed. A few weeks later I submitted a proposal to do a feasibility study for a photographic mural.

CHOOSING THE SUBJECT



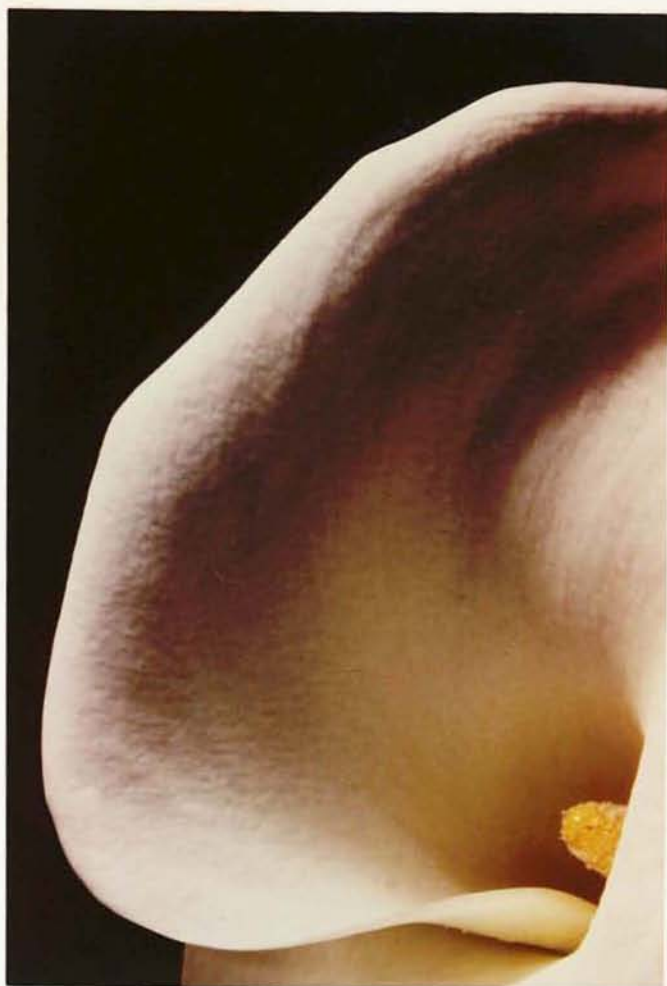
In choosing flowers to photograph, beside condition and translucence, they had to have particular visual interest (opposite), and not be so intricate as to be impossible to cut out successfully (this page).







Color was important depending on the method I used for the final printing. I started out taking strong colors because they register better on Cibachrome than pale ones.



Later in the project, after I had turned to laser printing and found that whites print exceptionally well, I started taking white and pale colors.

Reds printed poorly in every case. I asked tech reps at the different labs where this work was done and also consulted with Dr. Les Stroebe and Ira Current, both professors of photography at RIT, but the question was never satisfactorily answered. Below are two half tone stats and an offset printed piece (in color) made from the same slide of a red dahlia. The slide is very detailed but only the smaller half tone, made from an inter-negative, brings that out. The other two, made from direct negatives, are quite unacceptable. I had similar problems with those shown on the opposite page.



Laser print



Cibachrome transparency



Custom R-print

TRANSPARENCY MATERIAL

My thesis proposal called for translucent material:

"The play of light through transmitting photographic material will be assessed against the anticipated visual experience."

Both Cibachrome transparencies and Duratrans were designed for viewing by transmitted light, so I tried them both. But despite all the superior qualities of Cibachrome CTDF-7 film (archival, clear emulsion, saturated color, fine grain), neither it nor Duratrans proved useful for this project.

Viewed one at a time, transparencies did indeed have an appealing lucidity, having both a richness and brilliance that prints never have. Overlapping them, as the mural called for, did not produce any interesting variations in color. The effect was often weak, sometimes muddy. In addition, the ability to see through one flower to the next was distracting rather than interesting (right).

Since each flower was to be cut away from its background so that it could stand in a free relationship to the other flowers, I tried cutting several out. With heavy acetate over the light table to protect it, a magnifying light and a new blade, the most I could do was to pull the blade through the tough material rather than cut it. The resulting cut edges were whitish and rough.

Transparency material didn't work, and I looked for alternatives.

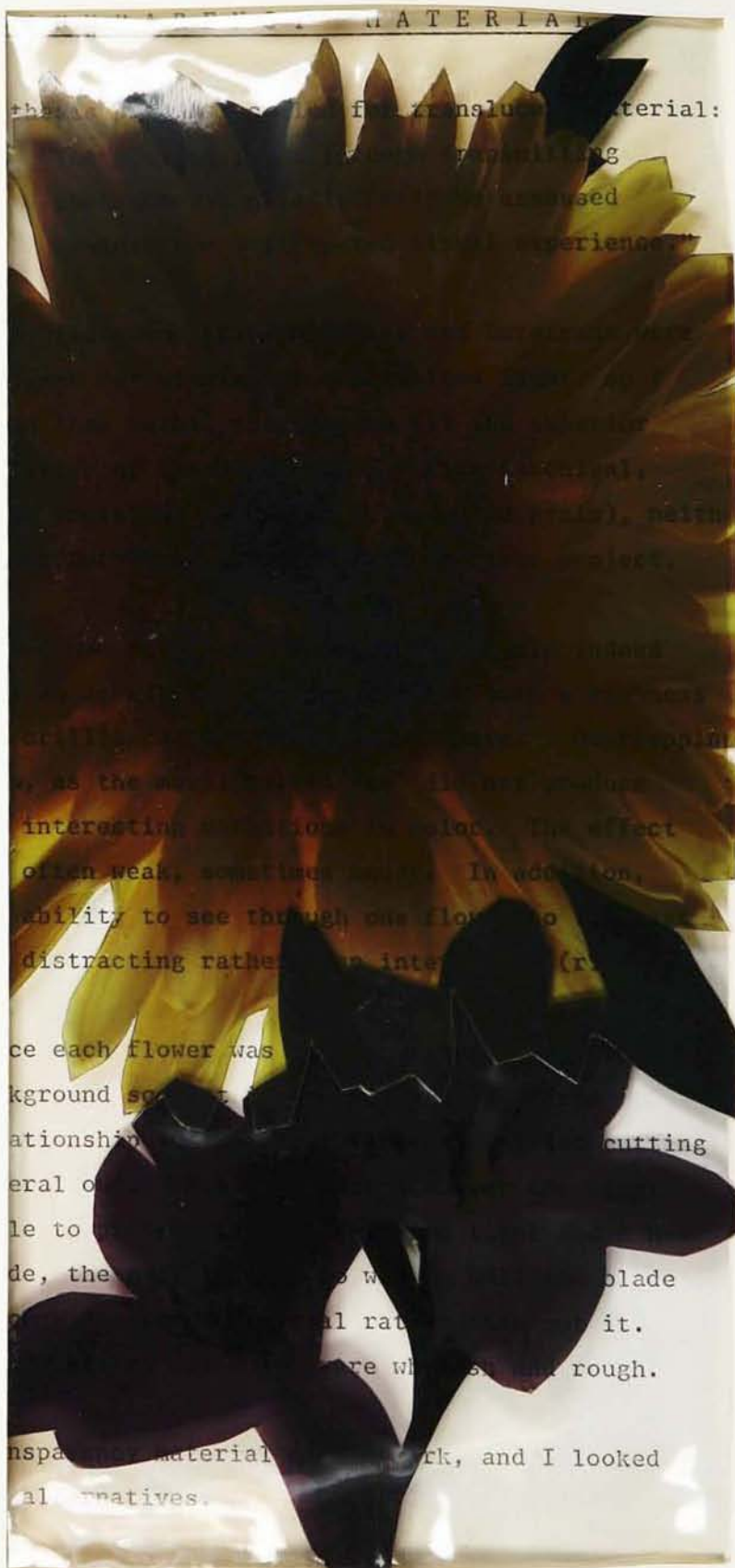
R I N N I N G B Y L A S E R

ing from slides to prints, or from
the slides, and the other way around.
prints, or I could make a negative
film and make contact prints. In all cases
the could be utilized in a variety of ways.

Considerable work has been done in the
at out between the two, and the results are
the bottom line is that the laser is a
highlighting, and the results are
to a single point of light, and the results
the best of all. The laser is a
a problem of the laser is that it
could display the results of the laser.

had been involved in the laser projects.
for the summer at Eastern State to produce the
world's largest trans-america. Measuring eighteen
feet, it is the longest in Grand Central Station,
New York, and the longest until now. This
feet. Norm
the Public Illustration
Department of the New York Public Library
and was known as the longest in the world.

the laser is a very simple device
image into electrical signals, and the
company that has claimed to be the
both the tonal range and the
of detail that exists in the
fraction of the cost of the other methods.
of their specialties was the size prints.



MATERIAL

the... of translucent material:
...transmitting
...the aroused
...experience."

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Going from chromes to prints was a let down. The slides I had taken could be used to make R-prints, or I could retake the flowers on negative film and make Ektacolor prints. In any case, none could be enlarged to mural size.

I considered sandwiching the Cibachromes I had cut out between two layers of plexiglass (a milky white bottom layer and a clear top layer), and backlighting, retaking on copy film, and enlarging into a single Duratrans. Framed with its milky white base as a built-in diffuser, it would simplify the problem of display. This option, however, would dismiss the spatial relationship I was after.

I had been involved in four separate projects over the summer at Eastman Kodak to produce the world's largest transparency. Measuring eighteen by sixty feet, the one in Grand Central Station, New York, had been the largest until now. This project called for thirty by fifty feet. Norm Kerr, manager of the Photographic Illustration Department, had been involved in both projects and was knowledgeable about photographic enlarging methods. He showed me very large prints made by a laser scanner. By converting a 35mm slide image into electronic signals, LaserColor, the company that did this, claimed they could reproduce both the tonal values and the same resolution of detail that existed in the original slide for a fraction of the cost of other methods. One of their specialties was mural-size prints.



The above print was made from a custom 4 x 5 inter-negative and the one at the right was made by a laser. The limitations of internegative film in handling the contrast range in this print is obvious. The purple petals are heavy, muddy and flat compared to the laser print. The delicate highlights in the yellow flowers are burned out, and the rendering of detail is nowhere as good as it is in the laser print detail. Also note the softness of the edge of the purple petal in the inset picture.



The shadows in the laser print above, both within the flowers and in the background, are open. The purple petals have a vibrant brilliance. The delicate highlights in the yellow flowers held. Notice the sharpness of the purple petal in the enlarged section. When compared to the enlarged section made from the standard inter-negative on the opposite page, the laser's ability to render fine detail is apparent.

R E N D E R I N G

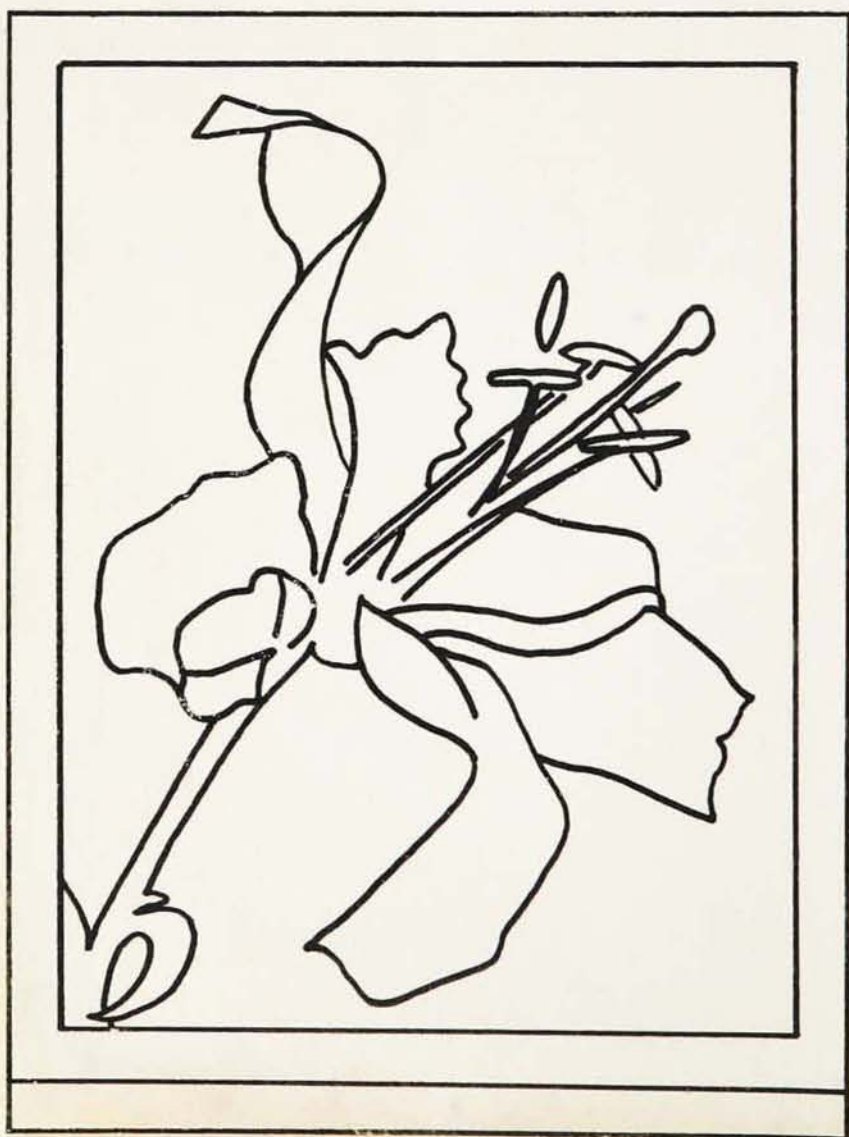
Before ordering the prints for the prototype mural, I made a rendered mock-up of each flower that I intended to use, and then projected each slide to an estimated size, traced, cut-out, and colored. By arranging and rearranging these, I could see the relationship between shapes, sizes, colors, and spacing: horizontally, vertically, and in depth. I used a scale of 2" equals 12", or a ratio of one to six.

Actual renderings used, opposite. And photograph of them in combination, below.



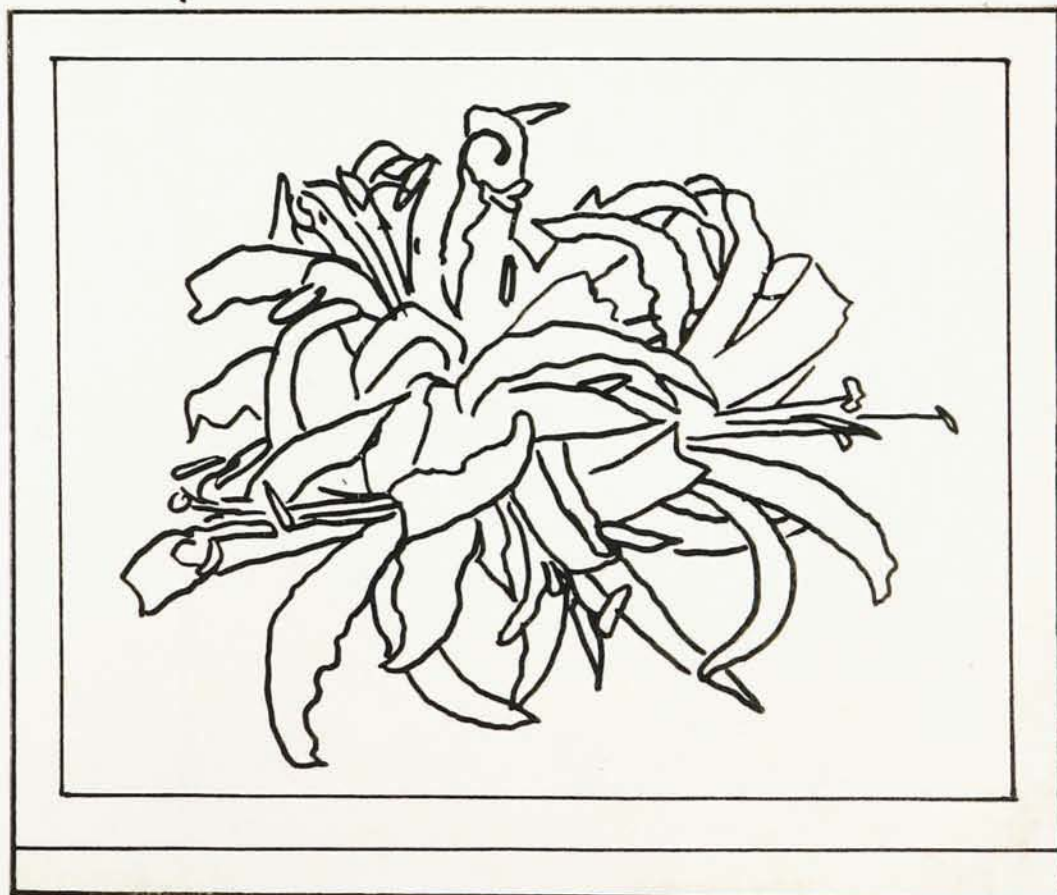
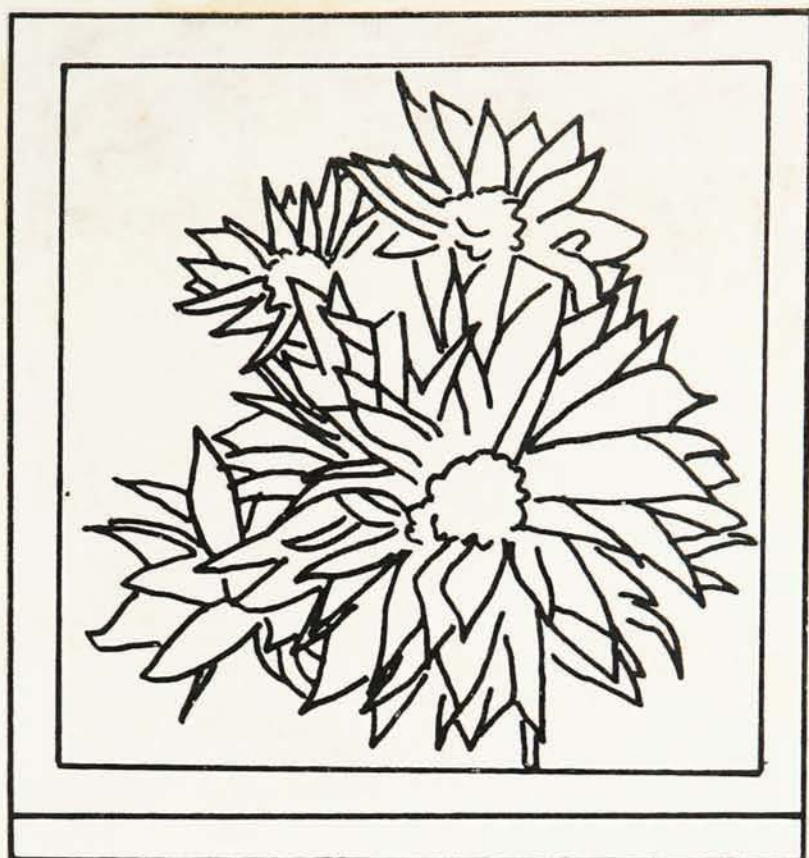


The milk white backing meant to act as a diffuser cut the light so that the embedded film lost too much of its brightness and sparkle.







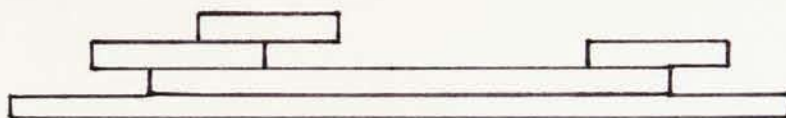


M O U N T I N G T H E P R I N T S

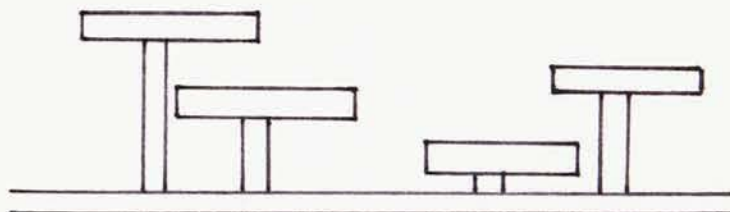
Mounting the full-size prints presents very few problems. Each can be laminated to half-inch Gator Borad ®, a rigid, lightweight display material, and then cut out with a jig saw.

Making the prototype presented many problems because its smaller size magnified the difficulty of making intricate cuts around flower petals. I tried experimenting with various mounting materials, cutting them on a jig saw with a jeweler's blade. Glass epoxy melted in the heat of the saw. Phenolic board, a thin, rigid material that cut well, contained phenol vapors, suspected of having formaldehyde in them which would fade color in the prints. The problem was finally resolved by cutting the Fome-Cor ® backing smaller than the flower and generalizing its shape so no exact match had to be made. The process stretched out over a month, and when it was finally solved reminded me of a quote from Baudelaire:

"Often when our other faculties only
find what they are seeking after
successive trials of several different
methods which are ill-adapted to the
nature of things, imagination steps
in and proudly and simply guesses the
answer."



Exhibiting the flowers as shown in the model was a deliberate attempt at creating a feeling of space by overlapping planes. To this end I tried layering flowers directly one on top of another. But the result was heavy looking (see cross section above).



To get an airy open look, I used spacers, varying the distance between flowers and arranged them so that they didn't touch each other (cross section above).

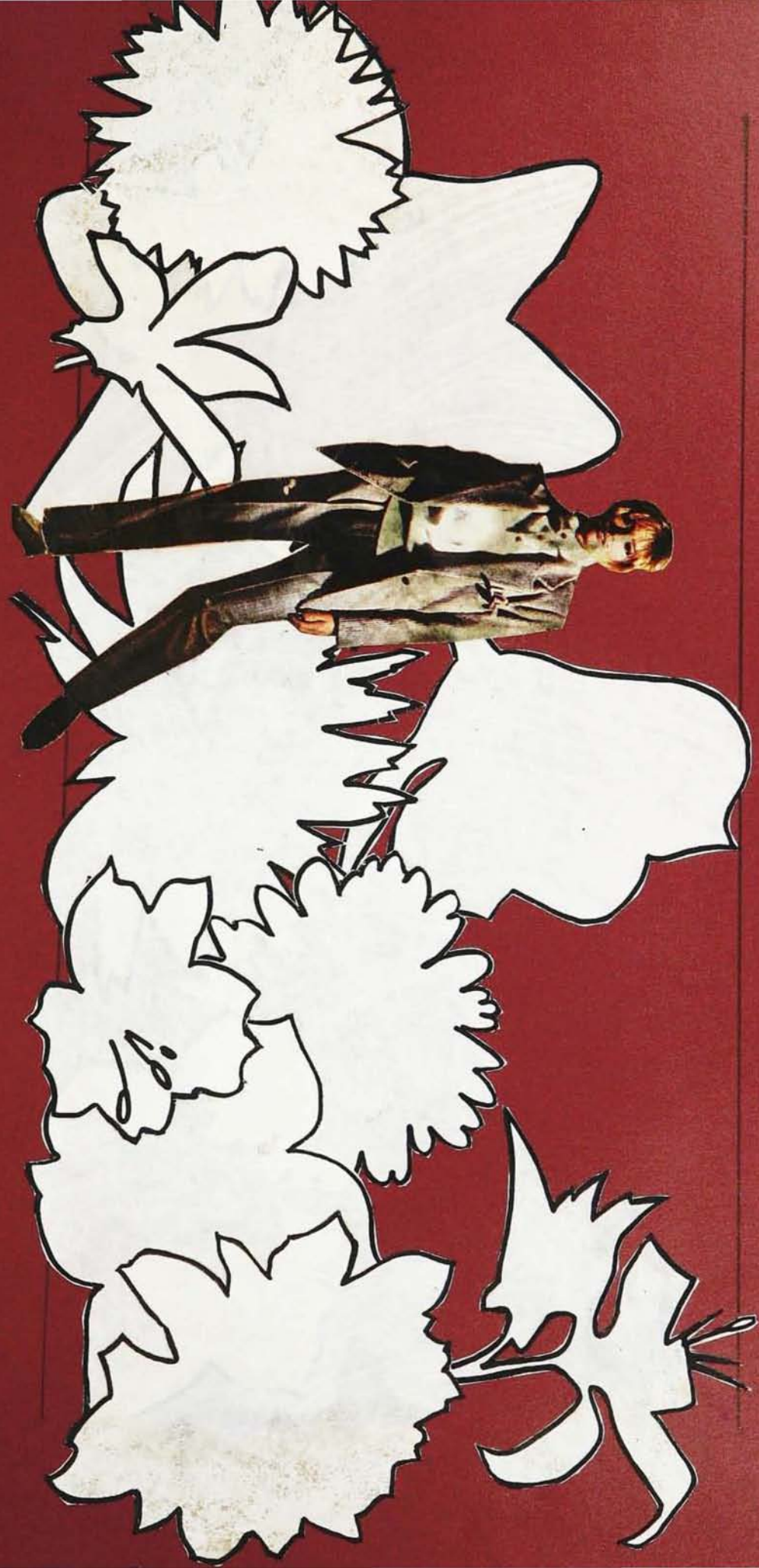
S C A L E M O C K - U P

To give a sense of scale, I made a twelve-foot section of the full-size mural in silhouette made up with a random selection of flowers.

To do this I projected a slide on the basement wall, but the 28 feet of space available was not enough to enlarge the flower to six feet. Since I didn't have any more space, I projected each slide and made a tracing to fit the format of an artograph. Then by projecting these tracings onto the Fome-Cor®, I could enlarge each flower in only four to six feet of projection space. I glued insulation blocks to the back of each cut out flower as spacers and hangers.

This size replica, opposite page, illustrates the scale of the flowers to a six-foot lady. It is in approximately the same size relationship as the installation in the show. >

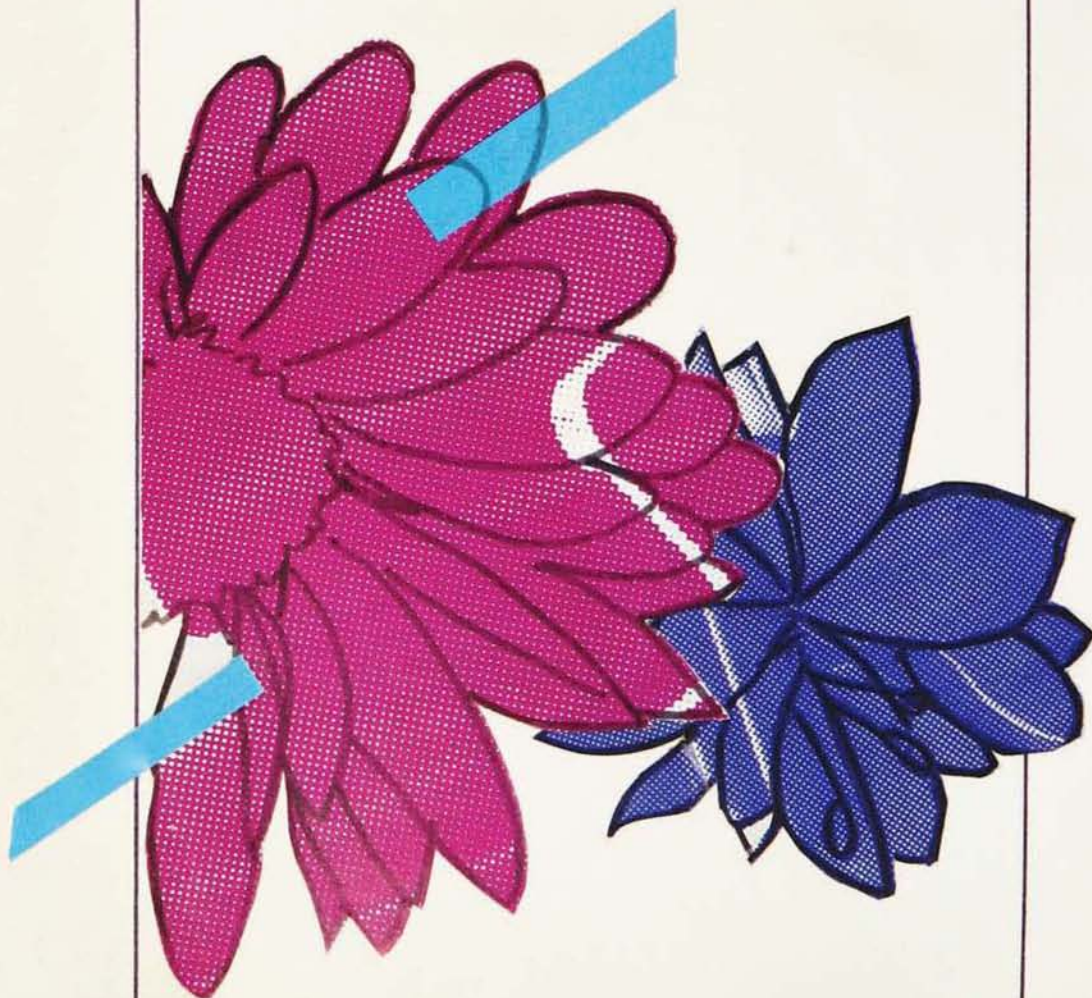


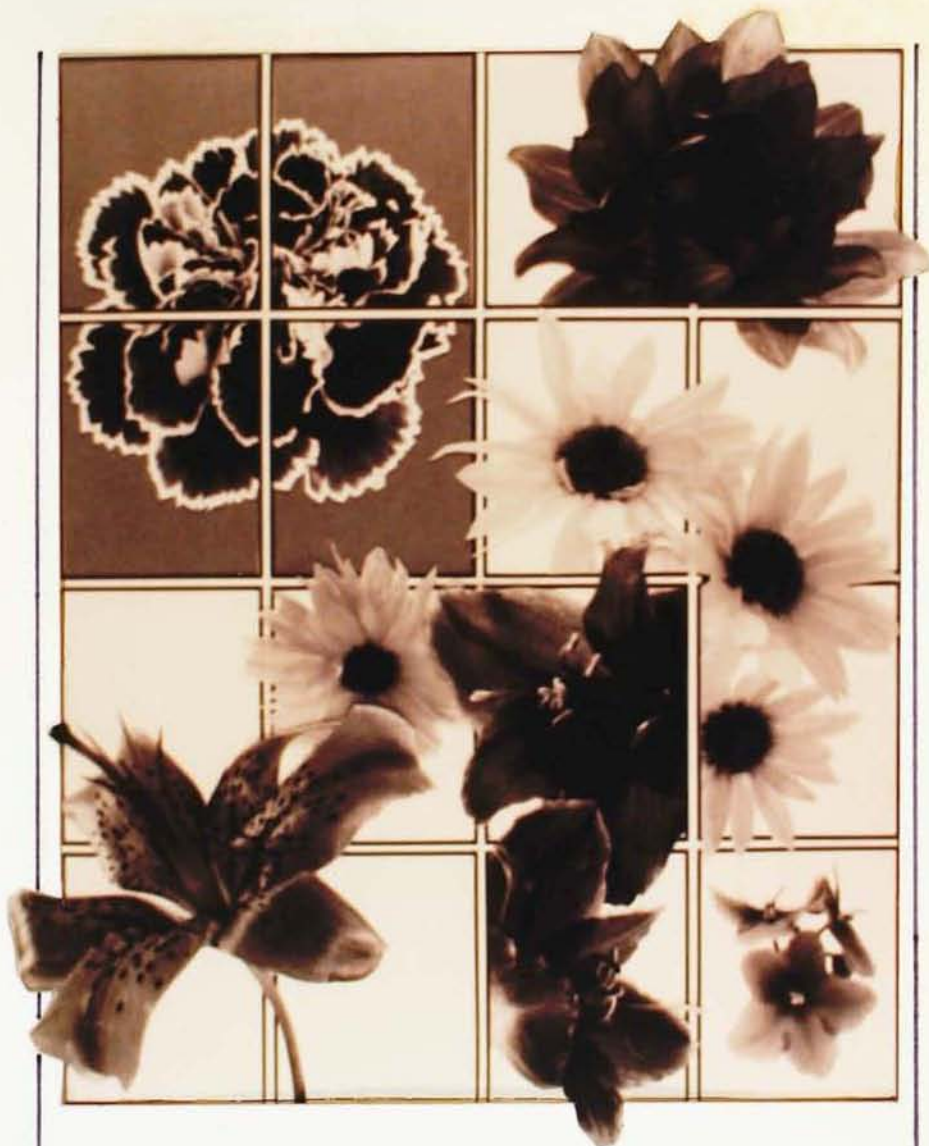


V A R I A T I O N S O N T H E T H E M E

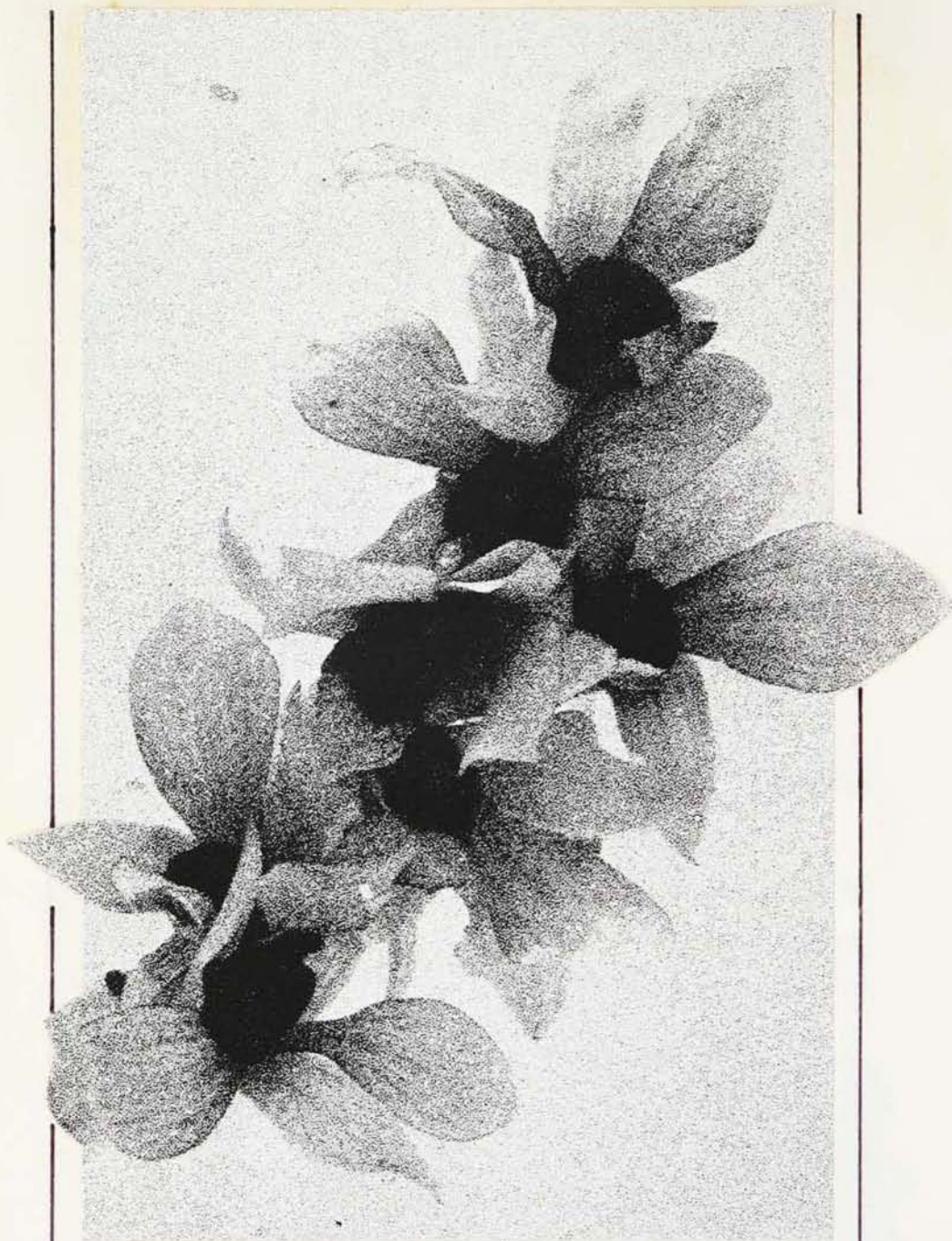
There are so many variations available in photography, in printing methods, and flowers themselves, that I couldn't resist exploring alternative combinations and try to imagine how the result might alter the look of the mural.

So in between taking photographs, drawing renderings, ordering prints, cutting and mounting the mural, embedding film in lucite, making models, matting and framing, and making a display case, I tried a number of variations, a few of which are shown here.

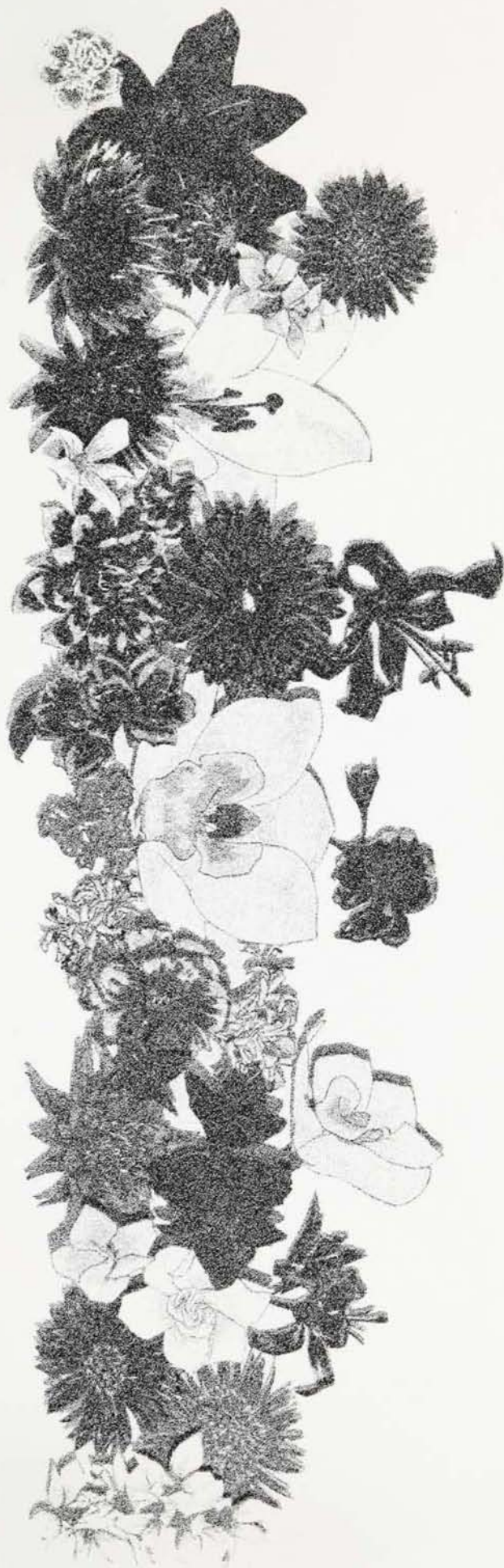




In one experiment, I made this section of a mural
using black and white prints.



Because I am very partial to the mood and texture of mizzotints, I made both individual flowers and also the whole mural by this method.



In electronic printing, the computer can be programmed to alter the information it receives from the scanning unit before exposing. I was interested in the effect this image manipulation might afford the mural, either by replacing the realistic flowers or intermixing the two kinds. What follows are five samples.









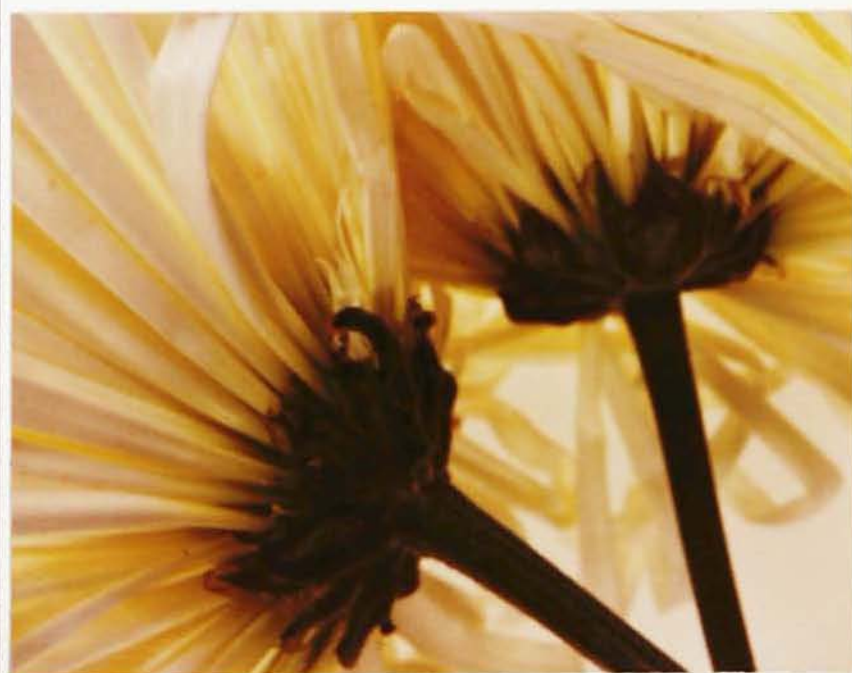
Up to this point, I had seen laser prints at Kodak and had read about their unusual enlarging capabilities. To see the resulting quality for myself, I had eight slides enlarged to 20" by 30" prints.

The challenge in doing this was to create a sense of drama. In the mural, the composition came from combining flowers creating a relationship between them (below). In this case, the interest had to originate in a single flower shown by itself (right and overleaf).









GALLERY PLAN

To plan the show, I measured the gallery and made a three-dimensional model of the space, and scale-size pieces to represent each unit I intended to display. The project had several characteristics which I took into consideration when laying it out:

- The work is a step-by-step progression leading in chronological order from the original concept to completion. Therefore, I wanted the space laid out so that it would be conducive to view the show in order.
- Each wall space serves the function of the focus of one unit of the whole.
- Several of the works are heavy and need a good supporting wall which must also coincide with their placement in the right order.
- The work is a close look at flowers. This is enhanced by their scale. I want reasonably intimate spaces.
- To hang the work for comfortable viewing, centerline at 56" from the floor.

← 12' 9" →

← 5 FEET →

← WINDOW →

PHOTO GALLERY FLOOR PLAN FOR MFA SHOW

Blue represents 10' display panels.
Red represents each piece to display.

Scale 3/8" = 12"

LINE THE DISPLAY
PANELS W/ THIS LINE →

STORE
ROOM
DOOR

← 7 FEET →

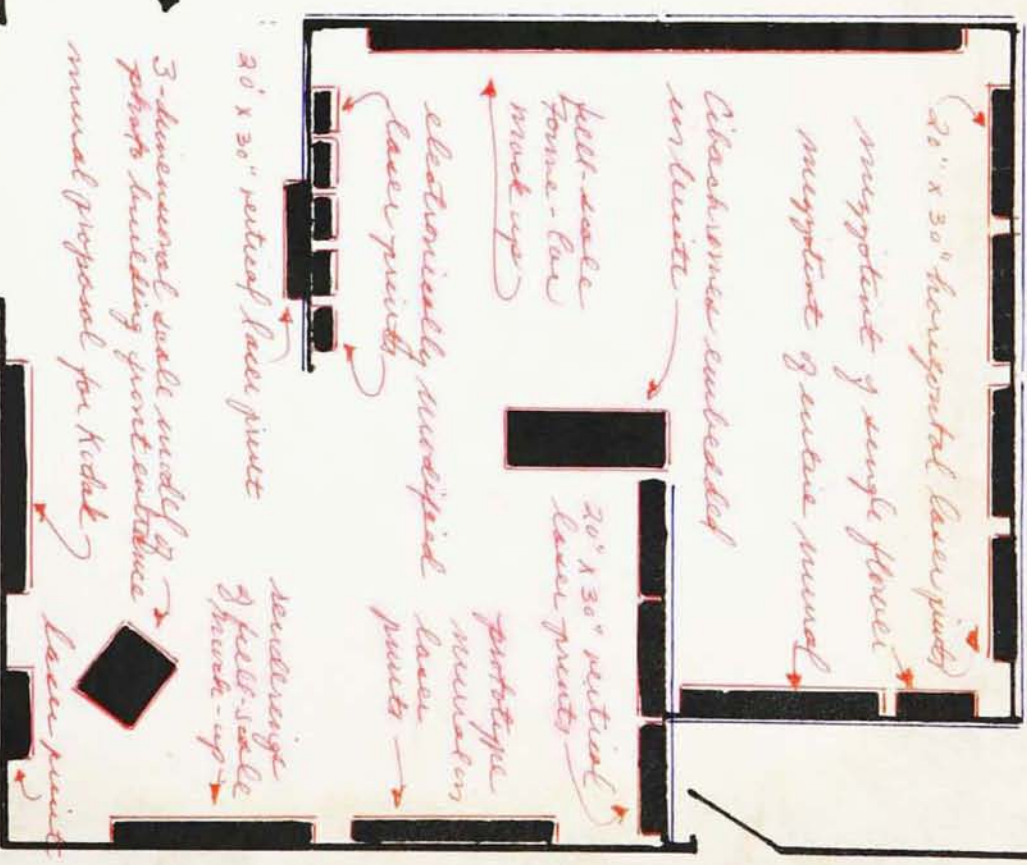
← 19 FEET →

← 8 FEET →

← 15 FEET →

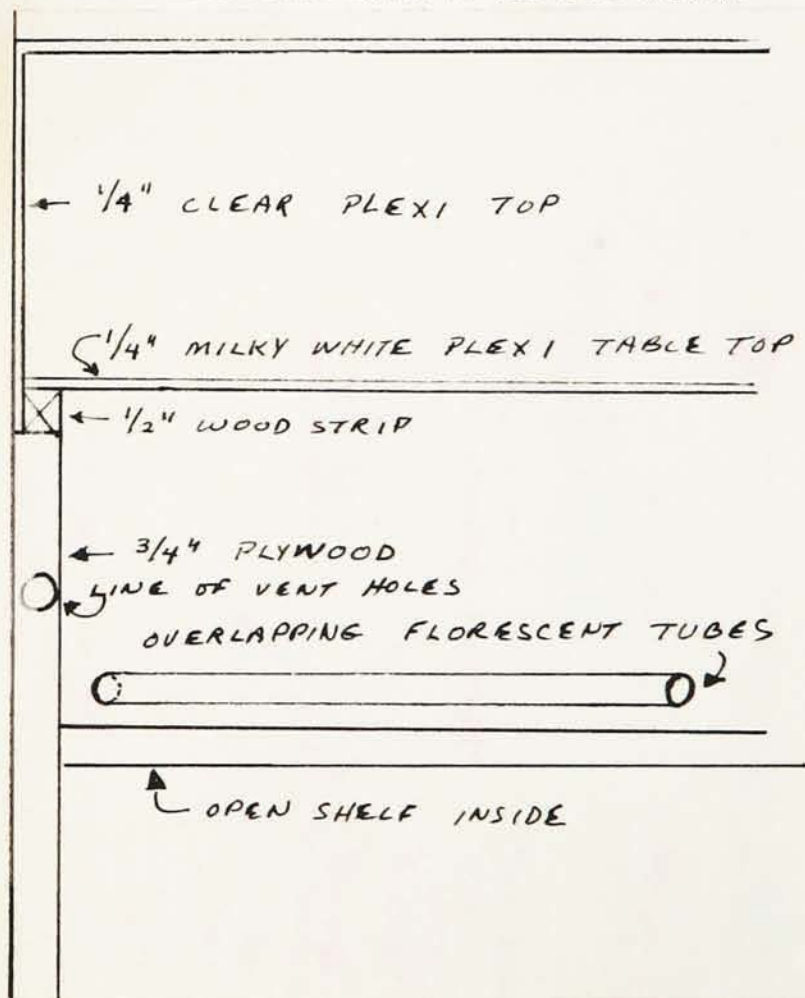
FIRE
DOOR

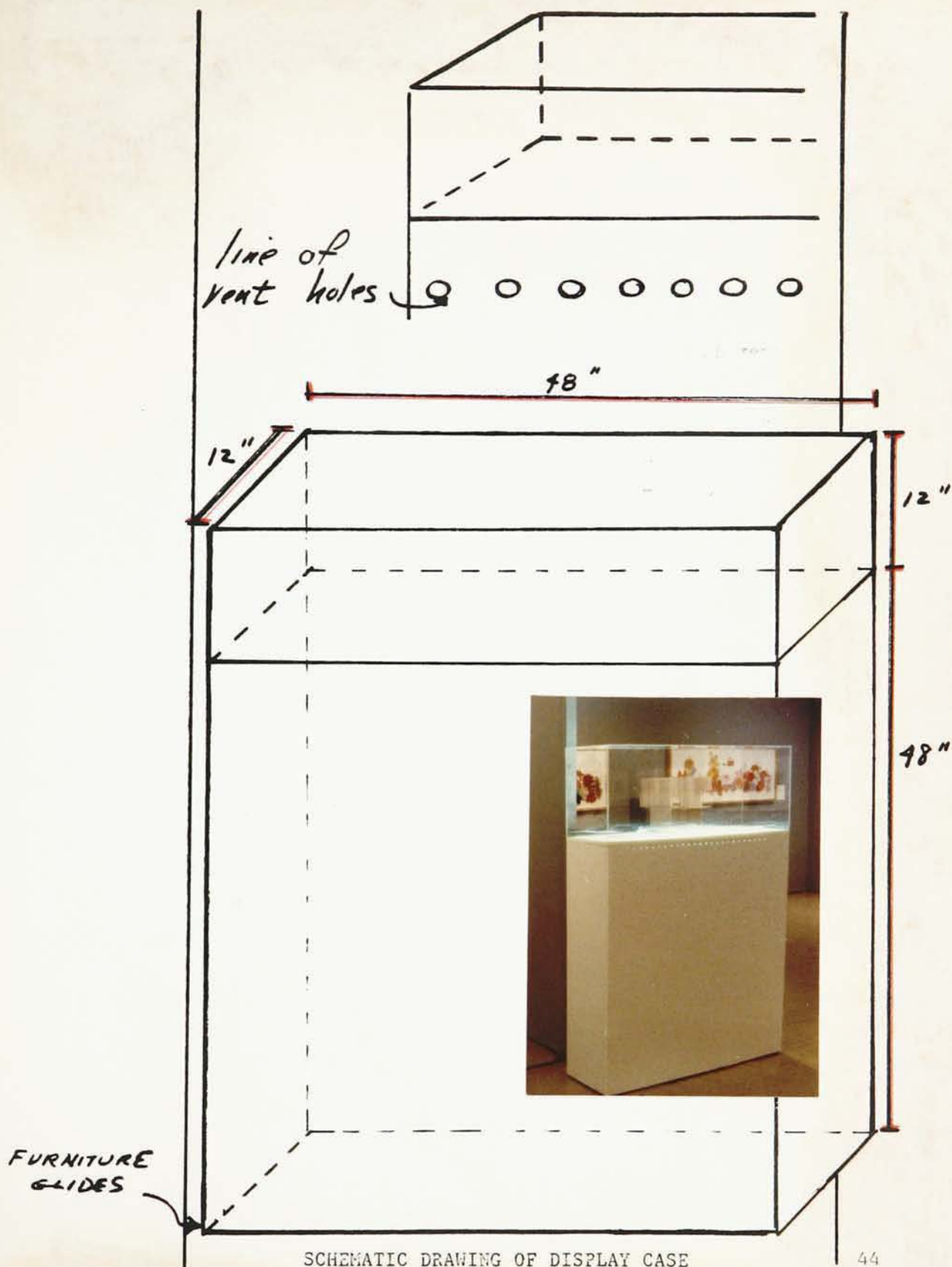
32 FEET



L I G H T E D D I S P L A Y C A S E

The lucite pieces needed both a lighted display table to show them off and a way to protect them. To that end I approached Toby Thompson, who, in addition to being the principle and creative director of Design, Etc. and Professor of Industrial, Interior, and Package Design in the College of Fine and Applied Arts, RIT, was also former director of the Bevier Gallery and steeped in display practices. Together we built a lighted display case with a screw-on lucite cover. It will remain part of the photo gallery equipment to be used for other shows as the need arises.



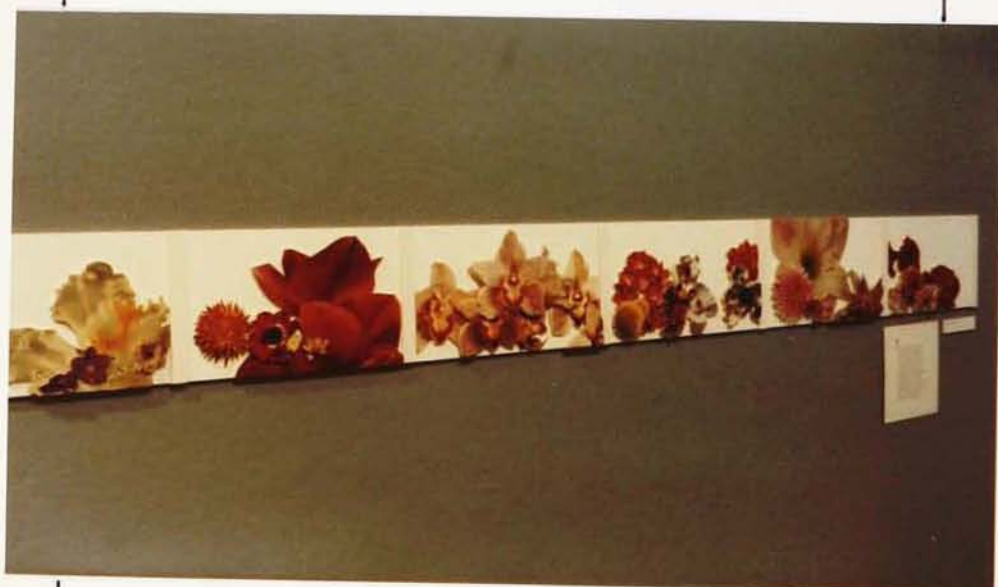


SCHEMATIC DRAWING OF DISPLAY CASE



This thesis show is, in part, a feasibility study to produce a thirty-foot wall mural with overlapping photographs of flowers, each from three to six feet tall, printed by laser.

On this and each of the following pages in this section, the information printed on the card by each unit of work in the show is reprinted below it.



This was the model with which I made the proposal to produce a prototype for a photographic mural for my thesis. It was originally submitted to Kodak as a proposal for a mural in a public space in Puerto Rico. Measuring 140 feet, it would have been the longest photographic mural in the world. Kodak eventually contracted a non-photographic solution, rejecting photography because of the cost. Though this model is somewhat the worse for wear, I still retain a fond attachment to it.



These prints were produced by converting a 35mm slide image into electronic signals using lasers. This method reproduces both the tonal values that exist in the original slide and the same resolution of detail.



D Richard Zakia, Chairman of the School of Photographic Arts and Sciences Fine Arts Department enthusiastically encouraged me to design the photo mural for a specific space: the Graphic Arts and Photography building main entrance. This three-dimensional model shows the placement of the mural in that space.



Conventional color transparency printing exposes by directly projecting the optical image. Laser printing converts a 35mm color transparency image electronically into laser generated video and then makes an exposure by laser light. I had these prints made to see the resulting quality.



My first choice was to use Cibachrome transparency material for the flowers. The idea of light passing through them was very appealing. Part of the problem using this material was to find a way to both protect and stiffen each flower so it would hold its shape. To that end I experimented with plastic embedding mediums. But the cost was prohibitive and mounting very difficult. The pieces shown here are an off-shoot of that phase.



In electronic printing, the computer can be programmed to alter the information it receives from the scanning unit before exposing. I was interested in the variations produced by this image manipulation and how the results might be incorporated into the mural.



Represented here is a twelve-foot section of the full size mural in silhouette made up of a random selection of flowers. It is possible to produce mural-size laser prints up to six by nine feet at a fraction of the cost of other methods.



My parents had always grown flowers: gardens full of them. Many of my first memories are of those gardens. There were many years when they entered and won the garden show for our area. My parents also made oil and water color paintings, and, of course, one of their favorite subjects was the flowers they grew. My father produced a series of fifty-two water color paintings of orchids many of which his father grew, and that collection became an exhibit in the Chicago Field Museum of Natural History. My father's parents, in turn, were florists by trade. And my grandmother was the originator of her state garden flower club. Though I had never given it any conscious thought, flowers were a natural choice as subject matter for my thesis.



There are so many variations available in photography, in printing methods, and in flowers, that it was interesting to experiment with a few combinations and imagine how the results might alter the look of the mural. I included mizzotints because I am very partial to their mood and texture.

FRAMING THE PRINTS

I contracted Lauren McDermott, Bachelor of Fine Arts in wood, School for American Craftsmen, R I T, to make the maple frames used in the show. They were especially well done and added significantly to the project.



Thesis Sharing

AFA ■ PHOTOGRAPHY ■ ROCHESTER ■ INSTITUTE ■ OF ■ TECHNOLOGY

FLOWERS

Wednesday, 4pm
9 April 1986

JOANNE BARBER



The question posed by Ken White, Professor of Photography at RIT, 'Why an MFA degree?' was the most challenging for me to articulate. It isn't a question I would have considered consciously. This is because I was brought up in a home where an appreciation for and participation in the fine arts pervaded the atmosphere. Both my parents and my brother went to art schools. My earning a degree in fine arts was a natural extension linking me to my family and my roots.

That this project was conceived, in part, as a commercial venture struck some people as incompatible with fine art. Their concern struck me as a non sequitur. Commercialism no more precludes fine art than self-expression insures it. The Sistine Chapel is no less a work of art because the artist was commissioned to produce a visual message reinforcing the teachings of the church on a ceiling. Tapestries are not less works of art because they warm castle walls nor are Roman mosaic floors less works of art because of their practical application.

I doubt if any of the originators of the above projects started out to create 'fine art'. What they produced became art when it was received as such by those who viewed it. The longer in time the work was valued as significant because of its beauty, its interest, or its ability to move the viewer, the more it became art and the less it retained significance because of its original intent. Fine art may be the intention

of the producer. It also may be the outcome of something done particularly well.

I am comparing situation and intention. Being personally confronted with the question of 'fine art' makes it difficult to answer without seeming either arrogant or self-deprecating.

What is of importance to me in this project is that flowers serve as a metaphore for some of the things I consider important. They justify their existence solely because they are beautiful. They are infinitely varied in design, color, and fragrance. They are as impressive one-on-one as they are in combination. They are direct, open, intimate, and larger than life. And they do all of this by being what they are naturally.



C O N C L U S I O N

What started out as a proposal to produce a scale model of a three-dimensional mural solving the problems of photography, enlargement, mounting, installation and cost, evolved into a jig-saw puzzle before all the problems were solved. The original proposal seemed straight-forward enough, but I found in executing each step, the answers were far more complex than I anticipated. The confusion I felt, caused by the many strands that ran through the project simultaneously, but at the same time seemingly unrelated, was, of course, alleviated each time an appropriate answer was found. Untangling the threads into separate strands in order to write the report also contributed to a clearer understanding of the process.

I learned a formidable amount about skills other than those photographic that were necessary to execute the project; and also related facets of presentation and display. I also generated some strong convictions about the cost of development. The mind can keep going but the meter can't. Every project, even esoteric academic ones, need financial reins as guidelines.

Through all this, photographing flowers, an anomaly for me, provided a much needed lift, like reaching out to old friends.

I plunged in naive, and true to form, emerged much wiser. In the beginning I thought it could be done, and in the end I saw that it could. What went on between the two was quite enlightening. The path was arduous, and it was amply rewarded.



A C K N O W L E D G M E N T S

I would like to recognize my thesis committee, Don Bujnowski, Andrew Davidhazy, and Richard Zakia for their interest and suggestions. I would especially like to thank Dick Zakia for his supportive attitude, intuitive understanding, and unerring diplomacy. In reviewing this written thesis, his responses were both informative and rewarding.

In addition I would like to thank Neil Montanus for his generous offer of time and help.

And finally I would like to pay special tribute to Toby Thompson at whose suggestion and urging I tackled this degree. His willingness to lend a hand (at times plunge in) were exemplary. I feel very fortunate to have been exposed to a wide range of materials and procedures and to have become a beneficiary of his expertise in the skills of presentation and display. He became both mentor and catalyst.

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A P P E N D I X

Lens and Format

M-Componon

Comparing Prices

Estimate to Produce

Photo Weekly

New York Times

Original Thesis Proposal

Framing the Prints

MFA Show Announcement



LENS AND FORMAT

My purpose was to get enough magnification of a flower to fill the frame and also get maximum sharpness from front to back so the resulting negative could successfully enlarge to print three, four, even six feet. I was free-lancing at Kodak when I bought a new lens for this purpose. The lens struck the photographers I was lunching with as a real curiosity. It looked like a copy stand lens (though it was listed only as a taking lens), had two shutters and no f/stops. What I had in hand was a Schneider 80mm M-Componon lens for a 4 x 5 with the promise of magnification from 1:1 to 1:7.

Neil Montanus, senior staff photographer in the Photographic Illustration Department at Kodak was there and offered to help me calibrate it. Testing resulted in good negatives, but it didn't actually cover 1:1. Using the rising front or the swings and tilts of the camera resulted in extreme vignetting. We focused by moving the camera closer to or further from the subject. However, the procedure was too clumsy to continue.

I returned the lens and went back to the question of how to get a negative that would enlarge to dramatic proportions and also get maximum depth of field.

Nile Root, Chairman of Biomedical Photography at RIT, showed me a set-up he had created for biomedical photography. He had rigged up a motor to move a subject past a light that came from slits in front of two projector lenses. As each

plane of focus moved past the light, the subject was exposed. Everything was in spectacularly sharp focus and no fall-off occurred. Excellent results but extreme for my project.



Examples on this and the following two pages were taken with a Schneider 80mm M-Componon lens stopped down all the way. 2400-watt strobes. This page, Polaroid 55, ASA 50. Using the rising front.



Polaroid ASA 80. No swings, tilts, rising front.



I did a little soul-searching (I am more comfortable with a 35mm), weighed the advantages and disadvantages of format size against film resolution; consulted Norm Kerr, director of the aforementioned Photographic Illustration Department at Eastman Kodak, who had produced eighteen by sixty-foot print film for Grand Central Station from 35mm slides. Convinced, I borrowed a 55mm Nikor 1: 2.8 lens, bought some Kodachrome 25 film, and started taking pictures. It turned out to be an excellent choice. I subsequently found out that laser prints are made from 35mm slides.



Ektachrome. No swings, tilts, rising front.

M-COMPONON

SCHNEIDER-Objektive der Reihe M-COMPONON sind Lupen-Objektive, mit denen man bereits bei der Aufnahme ein vergrößertes Bild des Objekts erreichen kann.

Sie stehen in den drei Brennweiten 28, 50 und 80 mm zur Verfügung. Ihr Anwendungsbereich liegt hauptsächlich bei Mittel- und Großformat-Kameras. Alle Objektive sind mit dem Anschlußgewinde M 29,5 × 0,5 versehen, so daß sie in jeden Verschuß der Größe 0 eingeschraubt werden können. Die nachfolgenden graphischen Darstellungen und Tabellen sollen den sinnvollen Einsatz der Objektive M-COMPONON erleichtern.

SCHNEIDER lenses of the M-COMPONON series have been designed for macrophotography, that is larger than life-size reproduction.

They are primarily intended for use in medium and large-format cameras and are available in three focal lengths: 28, 50 and 80 mm.

All of them have an M 29,5 × 0,5 screw thread and can thus be attached to any size 0 shutter.

The following graphs and tables are intended to facilitate intelligent use of M-COMPONON lenses.

Les objectifs SCHNEIDER de la série M-COMPONON sont des objectifs macrophotographiques avec lesquels on peut, dès la prise de vue, obtenir une image fortement agrandie du sujet photographié.

Ils sont livrables dans les trois focales 28, 50 et 80 mm. Ces objectifs ont été tout particulièrement conçus pour être utilisés avec des appareils de prise de vue, moyen et grand format.

Tous ces objectifs sont équipés d'une monture à vis M 29,5 × 0,5, de façon à pouvoir être fixés sur tous les obturateurs normalisés du type 0.

Les graphiques et tableaux ci-après sont destinés à faciliter l'utilisation rationnelle des objectifs M-COMPONON.



M-COMPONON

Abbildungsmaßstab

Wird ein bestimmter Abbildungsmaßstab gewünscht, können die erforderlichen Einstellwerte für den Abstand der Objektanlage bis Filmebene (Kameralänge) und der zugehörige Abstand Objekt-ebene bis Filmebene aus den Abbildungen 1 und 2 oder auch aus den Tabellen 4, 5 und 6 entnommen werden.

Zum Beispiel ergibt sich für das M-COMPONON 4.0/50 bei 6-facher Vergrößerung eine Kameralänge von 351 mm (Abb. 1) und ein Objekt-Bild-Abstand von 424 mm (Abb. 2).

Kameralänge

Die Kameralänge ist der Abstand zwischen Objektanlage und Filmebene. Zweckmäßigerweise ermittelt man für die vorhandene Kameraausrüstung den minimalen und maximalen Abstand zwischen der Vorderkante des Verschlusses Größe 0 und der Filmebene und markiert die Schnittpunkte mit den Kurven für die Objektive in Abbildung 1. So erhält man für jedes Objektiv die erreichbaren Vergrößerungsbereiche. Zur vollen Auszeichnung des Aufnahmeformats beachte man jedoch die Mindestvergrößerungen der Tabelle 1 und evtl. nachgesetzte Bauelemente der Kamera, die in den Strahlengang eingreifen können.

Reproduction ratio

The separation between lens seating flange and film plane (camera extension) and the corresponding subject-to-film distance for a certain reproduction ratio can be taken from Figs. 1 and 2 or Tables 4, 5 and 6.

As an example, a camera extension of 351 mm (Fig. 1) and a subject-to-film distance of 424 mm (Fig. 2) is obtained for the M-COMPONON 50 mm f/4.0 at 6x magnification.

Camera extension

Camera extension is the separation between the lens seating flange and the film plane. It is advisable to determine the minimum and maximum distances between the front edge of a size 0 shutter and the film plane for the camera to be used and to mark the points at which these values intersect the lens curves in Fig. 1. The result is the available magnification range for each of the lenses. To ensure perfect coverage of the negative size, allowance should, however, be made for the minimum magnifications given in Table 1 and any mechanical components that may possibly obstruct the light path in the camera.

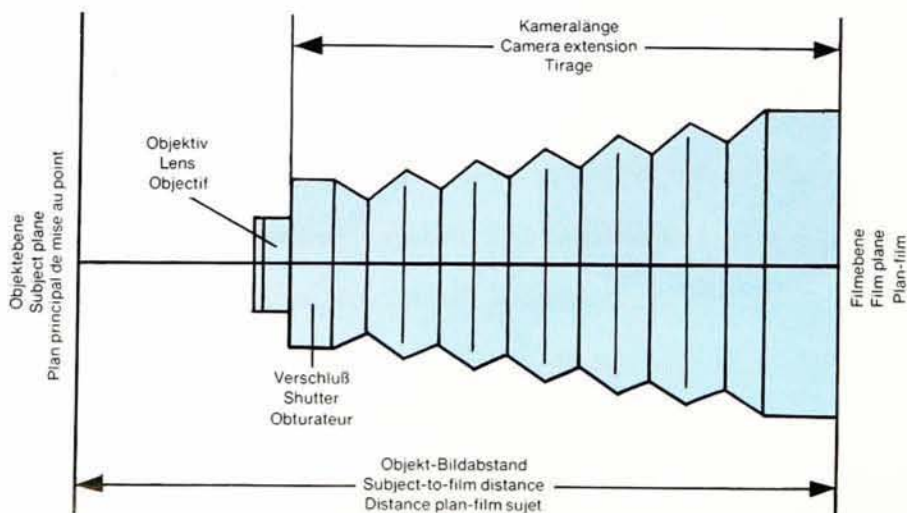
Rapport de reproduction

Si l'on désire obtenir un rapport de reproduction particulier, on trouvera sur les graphiques 1 et 2 ci-dessous ou dans les tables 4, 5 et 6, les paramètres à afficher; notamment en ce qui concerne le tirage ou distance entre la monture de l'objectif et le plan du film et la distance plan film/sujet.

Par exemple, pour obtenir un rapport de reproduction de 6 pour 1 avec le M-COMPONON f4/50 mm, il faut un tirage de 351 mm et une distance plan film/sujet de 424 mm.

Tirage

Le tirage est la distance comprise entre la monture de l'objectif et le plan du film. Il s'avère utile de déterminer les tirages minimum et maximum entre le corps avant de l'obturateur type 0 et le plan du film et de repérer les points correspondants à ces valeurs sur le graphique n° 1 en fonction de la focale utilisée; ceci vous permettra de savoir immédiatement quelle est la plage des rapports de reproduction que vous pourrez obtenir avec votre appareil, en fonction de chaque objectif. Pour être sûr d'obtenir une couverture parfaite sur la totalité de la surface du négatif, il faudra cependant vérifier qu'aux rapports de reproduction minima indiqués par les courbes du graphique n° 1, le trajet des rayons lumineux n'est pas perturbé par une partie quelconque de l'appareil, suite à une construction particulière.



Schärfentiefe (Fortsetzung)

Wegen großer effektiver Blendenwerte ist bei stärkerer Abblendung und stärkeren Vergrößerungen mit Schärfeverlust durch Beugungseinfluß zu rechnen; daher wurde in dem Bereich, in dem stärkere Minderungen der Abbildungsleistung durch Beugung zu erwarten sind, keine Schärfentiefenwerte eingetragen.

Depth of field (continuation)

The very small effective apertures required in macrophotography and the high magnifications used tend to degrade sharpness due to diffraction phenomena. This is why no depth-of-field data are given in the area in which a noticeable degradation of image quality may be expected due to diffraction.

Profondeur de champ (suite)

Les très petites ouvertures de diaphragme et les forts rapports de reproduction utilisés en macro ont tendance à procurer une certaine perte de netteté à cause de différents phénomènes de diffraction. C'est pour cette raison que le tableau n° 3 ne donne pas d'indications de profondeur de champ dans certaines plages où en fonction de la distance de prises de vues et du rapport de reproduction utilisé, on doit s'attendre à une perte de qualité assez sensible.

Tabelle 3

Schärfentiefe in mm

Abbildungs- maßstab Reproduction ratio Rapport de reproduction	Gravierte Blendenteilung					
	Engraved apertures					
	Gradation de la baque des diaphragmes					
	1	2	4	8	16	32
1:1	1.6	2.2	3.2	4.4	6.4	8.8
1.5:1	0.9	1.2	1.8	2.4	3.6	4.9
2:1	0.6	0.8	1.2	1.7	2.4	3.3
2.5:1	0.4	0.6	0.9	1.2	1.8	2.5
3:1	0.4	0.5	0.7	1.0	1.4	2.0
4:1	0.3	0.4	0.5	0.7	1.0	1.4
5:1	0.2	0.3	0.4	0.5	0.8	1.1
6:1	0.2	0.2	0.3	0.4	0.6	—
7:1	0.1	0.2	0.3	0.4	0.5	—
8:1	0.1	0.2	0.2	0.3	0.5	—
10:1	0.1	0.1	0.2	0.2	—	—
12:1	0.1	0.1	0.1	0.2	—	—
16:1	0.1	0.1	0.1	—	—	—
20:1	0.0	0.1	—	—	—	—

Table 3

Depth of field in mm

Tableau 3

Profondeur de champ en mm

Arbeitsabstände und Objektgrößen

Die zu berücksichtigenden Arbeitsabstände, das heißt der Abstand zwischen Aufnahmeobjekt und Fassungsvorderkante des M-COMPONON, sowie die sich ergebenden Objektgrößen für die Formate 65 × 90, 90 × 120 und 130 × 180 sind für ausgewählte Abbildungsmaßstäbe zusammen mit Einstellentfernungen und Verlängerungsfaktoren für die Belichtungszeit* in den Tabellen 4, 5 und 6 zusammengestellt.

Working distances and object fields

Tables 4, 5 and 6 summarize the free working distances, that is the distance between the subject and the front edge of the M-COMPONON mount, as well as the resulting object fields for the formats 65 × 90 mm, 90 × 120 mm and 130 × 180 mm for typical reproduction ratios together with focusing distances and exposure-time multiplying factors*

Distance de prise de vue / champ image

Les tableaux 4, 5 et 6 permettent d'obtenir d'un seul coup d'œil, un aperçu de la distance minimum réelle de prise de vue (mesurée entre la partie avant de la monture du M-COMPONON et le sujet), du champ image correspondant pour les formats 65 × 90 mm, 90 × 120 mm et 130 × 180 mm ainsi que des rapports de reproduction obtenus, avec le tirage et le facteur de prolongation du temps de pose* correspondant.

* Bei längeren Belichtungszeiten als eine Sekunde sind gegebenenfalls Besonderheiten des Aufnahmematerials bei einer Umrechnung zu berücksichtigen, die in der Regel zu längeren Belichtungszeiten führen

* For exposures exceeding one second, allowance should be made for possible reciprocity failure calling for additional exposure

* N.B. Pour des temps de pose de plus d'une seconde, il faudra tenir compte d'un écart à la loi de réciprocité en ce qui concerne le matériel photo-sensible (effet qui oblige d'une façon générale, à augmenter le temps de pose)

M-COMPONON

Abbildungs- maßstab	Abstand Objektivanlage bis Filmebene (Kameralänge) mm	Abstand Objektebene bis Filmebene mm	Arbeits- abstand mm	Verlängerungs- faktor für gemessene Belichtungszeit*	Gegenstandsgröße für Filmformat mm × mm		
					65 × 90 (58 × 81)	90 × 120 (83 × 114)	130 × 180 (122 × 171)
Repro- duction ratio	Lens-flange-to- film distance (camera extension) mm	Subjet-to- film distance mm	Working distance mm	Multiplying factor for exposure time metered*	Object field for negative size mm × mm		
					65 × 90 (58 × 81)	90 × 120 (83 × 114)	130 × 180 (122 × 171)
Rapport de repro- duction	Distance monture de l'objectif plan film (tirage) mm	Distance plan film- sujet mm	Distance de prise de vues mm	Facteur de prolongation du temps de pose*	Champ image en fonction du format du négatif mm × mm		
					65 × 90 (58 × 81)	90 × 120 (83 × 114)	130 × 180 (122 × 171)

Tabelle 4

M-COMPONON 4.0/28

Table 4

M-COMPONON 28 mm f/4.0

Tableau 4

M-COMPONON f 4.0/28 mm

4:1	140	181	21.3	25	14.5 × 20.3	—	—
6:1	199	238	18.8	50	9.7 × 13.5	13.8 × 19.0	—
8:1	258	295	17.6	80	7.2 × 10.1	10.4 × 14.3	15.2 × 21.4
10:1	317	354	16.9	120	5.8 × 8.1	8.3 × 11.4	12.2 × 17.1
12:1	378	412	16.4	170	4.8 × 6.7	6.9 × 9.5	10.2 × 14.2
16:1	494	530	15.7	300	3.6 × 5.1	5.2 × 7.1	7.6 × 10.7
20:1	612	647	15.4	440	2.9 × 4.0	4.2 × 5.7	6.1 × 8.5

Tabelle 5

M-COMPONON 4.0/50

Table 5

M-COMPONON 50 mm f/4.0

Tableau 5

M-COMPONON f 4.0/50 mm

2:1	140	231	59	9	29 × 40	—	—
3:1	183	274	50	16	19 × 27	28 × 38	—
4:1	245	323	46	25	14 × 20	21 × 29	30 × 42
6:1	351	424	41	50	10 × 14	14 × 19	20 × 28
8:1	456	527	39	80	7 × 10	10 × 14	15 × 21
10:1	561	631	38	120	6 × 8	8 × 11	12 × 17
12:1	667	736	37	170	5 × 7	7 × 10	10 × 14

Tabelle 6

M-COMPONON 4.0/80

Table 6

M-COMPONON 80 mm f/4.0

Tableau 6

M-COMPONON f 4.0/80 mm

1:1	124	320	145	4	58 × 81	—	—
1.5:1	164	333	118	6	39 × 54	55 × 76	—
2:1	205	360	105	9	29 × 40	42 × 57	61 × 85
2.5:1	245	392	97	12	23 × 32	33 × 46	49 × 68
3:1	285	427	92	16	19 × 27	28 × 38	41 × 57
5:1	446	577	81	36	12 × 16	17 × 23	24 × 34
7:1	606	733	76	64	8 × 12	12 × 16	17 × 24

Änderungen, die dem
Fortschritt dienen,
bleiben vorbehalten.

These specifications are
subject to change in whole or
part without prior notice.

Caracteristiques techniques
susceptibles de modification
sans preavis.

Comparing prices, laser prints are cheaper to produce than their counterparts:

	<u>C-prints</u>	<u>R-prints</u>	<u>Laser prints</u>
8 x 10	\$15.00	\$18.00	\$11.10
11 x 14	\$25.20	\$27.00	\$15.45

E S T I M A T E T O P R O D U C E

The following is a fairly accurate estimate of the cost to print, mount, laminate, and ship the full size flower prints. It does not include cutting or installing the finished flowers.

Mounting is on 3/16-inch Gator Board.

Laminating protects the photo finish as well as retarding fading due to exposure to UV.

<u># of prints</u>	<u>size</u>	<u>per print</u>	<u>total</u>
<u>PRINTING</u>			
11	24 x 36	\$115.50	\$1710.00
10	36 x 48	\$175.00	\$1750.00
7	48 x 62	\$265.00	\$1855.00
2	72 x 72	\$504.00	<u>\$1008.00</u>
			\$6323.00
<u>MOUNTING</u>			
11	24 x 36	\$ 20.50	\$ 225.50
10	36 x 48	\$ 29.30	\$ 293.00
7	48 x 62	\$ 59.80	\$ 418.60
2	72 x 72	\$ 97.20	<u>\$ 194.40</u>
			\$1131.50
<u>LAMINATING</u>			
11	24 x 36	\$ 13.15	\$ 144.65
10	36 x 48	\$ 27.25	\$ 272.50
7	48 x 62	\$ 54.45	\$ 381.15
2	72 x 72	\$ 82.80	<u>\$ 165.60</u>
			\$ 963.90
<u>TOTAL</u>			<u><u>\$8418.40</u></u>

Shipping PA to Rochester: \$200.00 for the crate plus trucking.



photo weekly

PHOTOGRAPHIC AND VIDEO MARKETING

Vol. 30 No. 7

Section A

March 18, 1985

Nobody Else Does It Like They Do; Laser Printing Gets Top Results

W. PALM BEACH, Fla.: Imagine being able to enlarge a 35mm slide to a 6 x 9 foot mural, and get perfect results! LaserColor Laboratories does it all the time—with the help of a unique laser printer that's theirs alone.

The lab picked up a lot of publicity a few years ago because of the ability to manipulate images on a computer and produce some fascinating results. Buried in all that fame was the fact that they were—and still are—a very busy professional lab providing a full range of photofinishing services to professional photographers and advanced amateurs.

Specialty of the house is making prints from slides, and the heart of the process is using the laser printer first then the Professional Video Analyzing Computer (PVAC). The process eliminates the use of internegatives, with their inherent problems, and going to dye transfer, with its high cost.

The printer is the product of a long-held aim of Alex Dreyfoos, president of Photo Electronics Corporation (PEC), the parent company of LaserColor Labs. He spent more than 10 years working on a method for making fine quality prints from slides. Finally, in tandem with George Mergens, he produced the merging of electronics and laser technology that is the LaserColor printer.

One of the printer's impressive list of capabilities is allowing the finisher to make corrections to the errors in transparency dye absorption; the results are almost the same in a print as projecting the slide on a screen.

It is that same talent that enables altering of images on the computer and producing the "art" prints that brought LaserColor into the limelight.

Having found the way, PEC has incorporated a flow of advancements into the printer, and a new printer is now in R&D.



Senator Howard Baker (far right), whose photography is almost as well known as his political career, visited LaserColor Laboratories in W. Palm Beach recently. Pointing out the features of this unique lab is Alex Dreyfoos, president of Photo Electronics Corporation (PEC), the parent company of LaserColor. Behind them are (from l.) George Mergens, executive vice president of PEC; Michael Page, senior vice president of the Bessimer Trust of Florida; and Jerry Ghiglietti, general manager of LaserColor Labs.

The LaserColor Laboratories division of PEC was established in 1978. With its flow of mail from across the U.S. and a sizeable local business as well, the company employs more than 40 people and works some 12 hours a day to produce C-41 and E-6 processing, reprints, proofs, enlargements and all the rest of the daily services of a pro lab.

Using the laser beam doesn't present any problems, but precautionary measures are taken. "You can't look directly into the light," said Jerry Ghiglietti, the lab's general manager. All laser units are kept in locked rooms.

PEC designs and manufactures a number of photographic products, the best known probably being the VCNA and PVAC they produce for Kodak.

A recent visitor to the W. Palm Beach installation was Senator Howard Baker, who is technically knowledgeable as well as an established photographer. Baker was sufficiently impressed to extend a planned one-hour visit to more than twice that.

Incidentally, Ghiglietti recommends that anyone who wants to make a 6 x 9 foot enlargement from a slide should shoot the original on Kodachrome 25.

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The New York Times

ARTS AND LEISURE

CAMERA

PEGGY SEALFON

Electronic Color Prints Made With Laser Beams

Electronics has already had a tremendous impact on the picture-taking equipment used by photographers. Now it seems to be ushering in a revolutionary new printing process.

Imagine a machine that in 20 seconds translates a 35mm slide into electronic signals using lasers. It then makes an exposure on negative film which becomes the key to making a precise print enlargement of the original transparency. The concept, combining lasers and electronics, is positively futuristic. The machine, which is called the LaserColor Printer, is here today with the very exciting capability of making great quality color prints from 35mm slides.

For years the greatest drawback of using slide film was always the dearth of acceptable printing methods. While photographers generally prefer fine-grained transparency emulsions to achieve better saturation and greater definition of details in their photos, they had to be willing to compromise if they eventually wanted prints made from those slides. Inexpensive prints produce colors that rarely represent the original and a slide's well-defined edges often get lost in the translation.

Processes relying on the use of inter-negatives are decidedly better, but still the necessary intermediate step alters original color and exaggerates unwanted transparency dye characteristics. It is impossible to match the sensitivity curves of reproduction material to the absorption curves of transparency dyes. The only satisfactory method has been a tediously involved dye-transfer process. Prints made by dye-transfer are unquestionably superior, but the process is both time- and labor-consuming to the point of becoming prohibitively expensive — especially for amateurs.

Alex Dreyfoos, physicist and amateur photographer, has been preoccupied by this very slide-to-print dilemma for over 10 years. He set about devising a method whereby high resolution color prints could be derived

from 35mm slides. His aim was to develop a process that eliminated distortions inherent in transfer processes and had the outstanding quality of a dye-transfer print, yet were priced at the cost of a C-print.

Dreyfoos's goal seemed unrealistic at first, but after almost a decade of intense research and development in collaboration with George Mergens, the LaserColor Printer was born. Now there is finally a viable alternative to dye-transfer for making fine quality prints. And instead of costing over \$220 — a typical price for an 8x10 dye — a LaserColor 8x10 print is a mere \$14.75.

At the television studios of WNYC two emissaries of the "father-firm," PEC LaserColor Laboratories, prepared a sampling of LaserColor prints for presentation during Casey Allen's show "In and Out of Focus." As the prints, ranging in size from 8x10 to 30x40, were removed from their brown paper wrappings, the studio filled with vibrant colors. The most striking characteristic was a glow, a marvelous luminosity that was reminiscent of transparency materials.

But these were prints. How could they possibly have retained a slide film's translucence? James Shepherd and Charles Bray of LaserColor Labs smiled knowingly. Obviously, they realized that these were no ordinary prints. In fact, two very distinct kinds of prints emerged. One possessed an uncanny realism that scintillated with true-to-life colors. The other type had an entirely different look. The colors were strong and luminous but highly unnatural. Values were reversed. Subtle shadings had been transformed into chunks of separate color — of course, posterizations! No, declared Shepherd, LaserColor Art Prints!

Two basic print modes are possible with this unique electro-optical system: normal color or "art" reproduction. A "faithful" color reproduction maintains the tonal values that exist in the original slide. In this normal mode, the print offers the same visual impression as obtained by projecting the original on a wall, says Alex Dreyfoos. The other choice, the LaserColor Art, is a

kind of true-color posterization which follows the color scheme of a slide but lays down colors in blocks that give a painterly impression to an image.

The remarkable LaserColor Printer totally departs from former reproduction principles that depend upon light passing through film and exposing some other material. A completely unconventional process, it mates sophisticated laser technology with electronics. Part of the amazing breakthrough lies in the laser's capability to be focused on tiny spots and in their spectrally pure colors. These elements contribute to high image sharpness and faithful tonal reproduction.

However, the other half of the story, rooted in the properties of electronics, is even more astounding. Once an image is in electronic form, extraordinary corrections are possible. Many known errors in transparency dye absorption can be altered by electronic processing in order to cancel the effects of undesirable absorptions.

Here are the steps this process follows:

The printer passes three coherent laser beams through the slide. These lasers of red, blue and green rapidly scan across infinitesimal segments of the film. The light is picked up by photomultiplier tubes which generate electronic signals according to the densities of red, blue and green in the image. A lot of light passing through the slide generates a lot of signal; a little light gives a smaller reading. These electronic signals come through circuit boards which then feed them into a computer that processes the information. Finally, the signals are used to drive three separate laser beams which make an exposure on film. It all happens in about 20 seconds.

The wondrous aspect is that the film negative is made electronically, not optically. For the first time, reproduction is not dependent upon light just being transmitted through film, filters and optics, so it does not suffer from optical limitations. Furthermore, the negative film need not be special inter-negative stock because the transfer

Continued on Page 43

CAMERA

Electronic Color Prints

Continued from Page 41

characteristics of the system can be fully controlled.

However, the film must have high resolution and fine grain, and be readily available — and Kodak's Vericolor II in 70mm rolls meets these requirements. Following the "electronic" exposure the Vericolor film is processed normally and a conventional enlargement is then made on Ektacolor 74 RC paper.

The negative is a laser-made original. "Instead of the Vericolor film taking a picture of the slide, it's almost as if it's looking past the slide back to the original scene," says Alex Dreyfoos, who is president of PEC LaserColor Laboratories. In a properly exposed slide, for instance, the brightness of blacks is very much compressed, rather than delineated as in the original scene. Yet the computer perceives a record of delineations. Small differences in density are picked up which in the real scene had much bigger differences. The computer has the ability to open these areas up so that when the LaserColor negative is exposed with laser beams, the proper brightness is achieved.

The electronic stage is perhaps the most confounding because it is at this middle phase that all these corrections are made. It is also the stage at which the LaserColor Art mode can be programmed, with thousands of possible variations. Colors are laid down in blocks instead of in normal continuous tones. As Dreyfoos explains, "it creates an artistic tunnel effect. It takes continuous tones and puts them in a category. The information is put in the computer, which instead of accurate reproduction just pigeonholes the category. As the beam goes across from dark to light, the computer assigns several tones to fall into one range of brightness."

The site of this futuristic printing processor is in West Palm Beach, Fla. Fortunately, as of this year PEC has made LaserColor available to the public by mail, and this takes about a week, mailbox to mailbox.

A few directions should accompany each order. Since PEC has the ability to make specific corrections for each type of film used, it helps to indicate film type. Any film can be handled by the machine, including 25-year-old Kodachrome I.

The type of print desired should be indicated — whether normal color reproduction or the more interpretative LaserColor Art print — and the size wanted. Since 35mm format does not enlarge to exactly 8x10, either slight edges of the image will be cropped or some border will remain at the top of the print. If a full 8x10 print is desired, a client should indicate which edges of the slide may be sacrificed. Otherwise, PEC will make a full-image print (which they recommend) with borders that can be trimmed.

The best way to determine which slides make the best LaserColor prints is to project them. Slides that are too dense will not work well. Badly underexposed slides have too much image jammed up on the shoulder portion of the H&D curve and will be difficult to recover. While the computer can open up areas to a degree, there comes a point at which there is not enough information to deal with.

For those keen on trying the innovative LaserColor Art mode, but who do not want to leave thousands of choices up to the PEC printmaker (and is not about to board a flight for Florida) there is another solution. Charles Bray has a little magic previewing machine in New York City. A photographer can make an appointment to use the

LaserColor Previewer which synthesizes what the actual printer does, and thus gives a preview of how the print will look.

Essentially the previewer is a video system with a carousel tray that projects the image onto a video monitor. Four switches allow the photographer to dial in more than 3,000 different programs for any one image. When satisfied with the image flicked onto the screen, the dial settings are recorded and sent with the slide to Florida where the LaserColor Printer makes the reproduction. The previewer is not nearly as accurate or as sharp as the Laser Printer, but it does simulate the switchings and transitions of colors close enough to provide information in electronic code form so that the Laser Printer can take over.

Peggy Sealfon is East Coast editor of Petersen's PhotoGraphic magazine.

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FLOWERS: A THESIS PROPOSAL

by

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Submitted in Partial Fulfillment of the
Requirements for the Degree

MASTER OF FINE ARTS IN PHOTOGRAPHY

MFA PHOTOGRAPHY PROGRAM

SCHOOL OF PHOTOGRAPHIC ARTS AND SCIENCES

ROCHESTER INSTITUTE OF TECHNOLOGY

May, 1985

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PURPOSE

I propose to make a free-form three-dimensional mural comprised of large, overlapping flowers in a translucent material, backlit, and hung in an integral relation to a specific space.

BACKGROUND

I have always liked three-dimensional concepts and spatial relationships. This interest drew me to years of satisfying work in sculpture, a love of geometry, an interest in architecture, and years of dancing. I would like to apply photography, ordinarily thought of and used as a two-dimensional medium to a three-dimensional concept. I am interested in overlapping and layered photographs in relation to each other, to the space these combined photographs occupy, and in relation to the viewers who will come into this space.

I would like to combine this three-dimensional concept with the quality of light that is transmitted through translucent photographic material. I like the colorful light and airy quality that results.

The subject that I chose is one very dear to my heart: flowers. I like everything about flowers: color, shape, texture, pattern, fragrance. My paternal grandparents were commercial flower growers. My grandmother started the first garden flower club in her state. My parents produced gardens that won prizes every year. My father's set of fifty-two water-color paintings of orchids were displayed in the center court of the Field Museum of Chicago along with the live plants both because of their beauty and botanical accuracy. Flowers have been part of my life since my mother started me collecting and pressing wild flowers when I was five. I would enjoy producing a large colorful display of them playing with light and space, and juxtaposing one interesting shape on another.

PROCEDURE

I have already made a three-dimensional mock-up of the flower mural using foam-core and cut-out flowers to conceptualize the idea. Now I propose to look over other ideas that have been done along this line: sources that might add to or open up options to enhance the basic idea.

Next I propose to make several negatives to see which format and lens will produce the best depth of field, definition, and enlargement suitable for the project. From the chosen negative I will make several prototype flowers: specifically duratrans, cibachrome and dye transfer. The play of light through transmitting photographic material will be assessed against the anticipated visual experience.

Once I have decided on the best format, lens and reproduction method, I will make approximately forty flowers ranging in size from one to four feet. These will be arranged so as to overlap one another in a play of color and shape.

I will discuss the technology of both holding the transparency rigid so light can pass through it, as well as lighting techniques and ratios with people who have dealt with these problems. Two people who I intend to discuss this with are Norm Kerr, head of the Photographic Illustration Department, and Joe Federico, Exhibition Design, both at Eastman Kodak Company. Both work directly with the large colorama transparencies hung in Grand Central Station.

I will make scale drawings of the flowers in relation to the space in which I intend to display them, and in relation to the viewer who will enter this space.

The last consideration will be the actual installation and lighting of the exhibit.

For this total effort I propose a time-frame of three months: mid-May to mid-August.

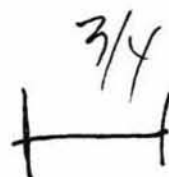
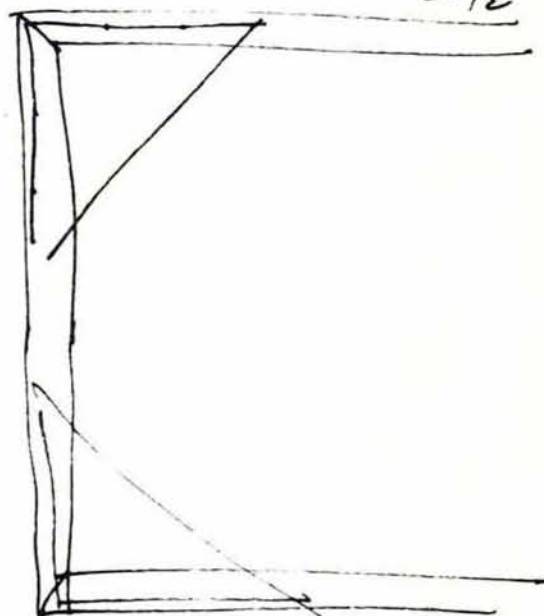
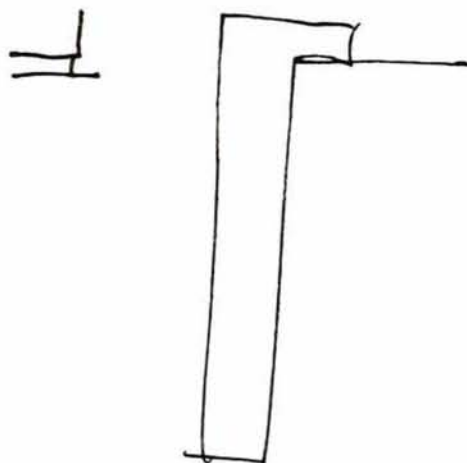
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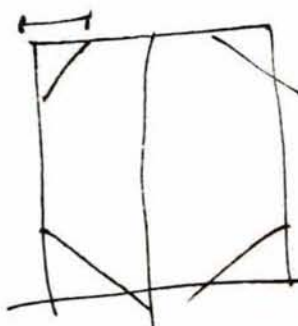
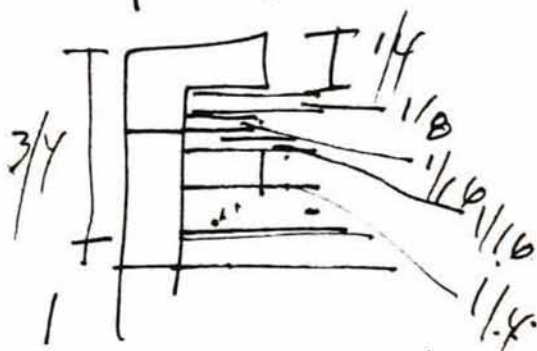


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FLOWERS

JOANNE BARBER

A Thesis Show

RIT College of Graphic Arts & Photography

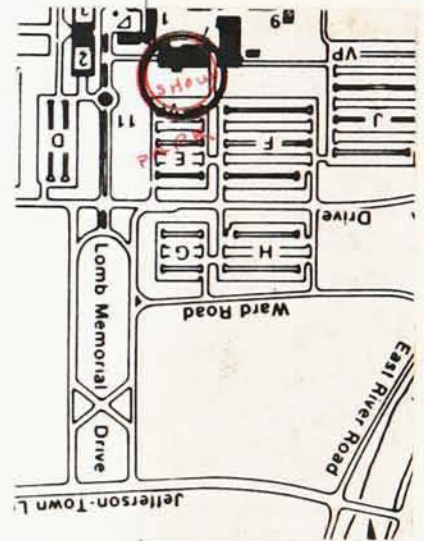
Photo Gallery (3rd floor)

April 7 thru 11, 1986

Open daily 9 to 6

PANTONE
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Opening R E C E P T I O N April 5 from 7 to 9



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JOANNE BARBER

A Thesis Show

RIT College of Graphic Arts & Photography

Photo Gallery (3rd floor)

April 7 thru 11, 1986

Open daily 10 to 5

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